Reading 2.1

3.3 Schema theory

Learning outcomes

- Evaluate schema theory with reference to research studies.

● Examiner's hint
For applications of schema theory in abnormal psychology see pp. 160–161.

Schema theory is also extensively discussed in section 3.4 (pages 73–77) where the reliability of memory is addressed. It is further discussed in Chapter 5, where stereotype formation and the effects of stereotypes on behaviour are covered (pages 113–118).

Knowledge stored in our memory is to a very great extent organized. There are many theories of knowledge organization – **schema theory** is just one of them. The main idea underlying this theory is that new encounters with the world are rarely, if ever, completely new. Rather, the way we process information at any particular moment, or the way we act in specific settings, is determined to a very significant extent by relevant previous knowledge stored in our memory and organized in the form of schemas.

Bartlett was carrying out research on memory, a cognitive process, during the behaviouristic era in psychology. He published most of his research in 1932.

A schema is a cognitive structure that provides a framework for organizing information about the world, events, people and actions. This is consistent with the views of Bartlett (1932). In his pioneering work on the effects of schemas on memory, some of which is discussed below, he viewed schemas as organizations of past experience.

Different terms are often used to refer to schemas relevant to different aspects of our world.

- **Scripts** are schemas which provide information about the sequence of events that occur in a more-or-less unchanging order in particular contexts such as going to a restaurant, visiting the dentist, or attending a class.
- **Self-schemas** organize information we have about ourselves; for example, information stored in our memory about our strengths and weaknesses and how we feel about them.
- **Social schemas** (e.g. stereotypes) represent information about groups of people; for example, Americans, Egyptians, women, accountants, etc.

Over the years, theorists in many areas of psychology have used the schema notion to explain a huge variety of phenomena. Most of the discussion in this chapter relates to the effects schemas have on memory. The discussion owes a lot to the work of Bartlett (1932) on the effects of previous knowledge on the comprehension and remembering of texts.

An outline of schema theory

The term *schema theory* is used to refer to a number of interrelated ideas, proposed over the years by several theorists to account for the influence of stored knowledge on current information-processing and behaviour. Schema theory has benefited particularly from the work of Bartlett (1932), Rumelhart (1975) and Schank and Abelson (1977). According to these theorists, schemas perform many interrelated functions:

- they organize information in memory
- they can be activated to increase information-processing efficiency
- they enable the generation of expectations about objects, events and people
- they regulate behaviour
- they are relatively stable and usually very resistant to change thus ensuring continuity in the ways we process information and the ways we act.

Try and imagine how life would be without schemas or similar cognitive structures.

Schemas can also lead to distortions and mistakes when:

- settings are unfamiliar (and thus require novel approaches)
- the wrong schemas become activated.

Experimental studies of the effects of schemas on memory

EMPIRICAL RESEARCH

The effect of schemas on memory (Bartlett, 1932)

Bartlett asked his English participants to read *The War of the Ghosts*, a Native American folk tale. The first part of this story is reproduced below.

> One night two young men from Egulac went down to the river to hunt seals and while they were there it became foggy and calm. They heard war cries, and they thought, 'maybe this is a war party.' They escaped to the shore and hid behind a log. Now, canoes came up, and they heard the noises of paddles and saw one canoe coming up to them. There were five men in the canoe, and they said, 'What do you think? We wish to take you along. We are going up the river to make war on the people.'
>
> One of the young men said, 'I have no arrows.'
>
> 'Arrows are in the canoe', they said.

◁ Native American hunters in traditional canoes.

The participants' memory for this story was tested by Bartlett by using two techniques, **serial reproduction** and **repeated reproduction**. In serial reproduction, the first participant reads the original story and then reproduces it on paper. The first participant's reproduction is read by the second participant who also reproduces it for a third participant. This procedure continues until six or seven reproductions are completed by an equal number of participants. In repeated reproduction, the same participant contributes all six or seven reproductions. This takes place in a number of attempts separated by intervals of from 15 minutes to as long as several years, from reading the original story. In Bartlett's studies these two methods led to very similar findings.

Unsurprisingly, with successive reproductions the story became increasingly shorter. However, the most important findings related to the distortions the participants introduced in their recall of the story. Several of these distortions were in the direction of making the story more understandable from within the participants' experiences and cultural background. Thus, activities which were culturally unfamiliar (e.g. hunting seals) were changed into more familiar ones (e.g. fishing). On several occasions, 'canoes' became 'boats'. The combined effect of these changes was to transform what started as a very strange tale into a conventional English story.

EXERCISES

1 Why do you think Bartlett used an unfamiliar story in his study?

2 Is it not strange that Bartlett published this study in 1932 during the behaviouristic era?

According to Bartlett, the way the participants recalled the story came under the influence of relevant schematic knowledge in their memory. Such knowledge consisted of schemas acquired in, and reflecting, the participants' own culture. Bartlett used the term **rationalization** to refer to the process of making the story conform to the cultural expectations of the participants.

Memory is an active reconstructive process rather than a passive reproductive one.

The picture of memory emerging from Bartlett's work is that of an active reconstructive process, rather than a passive reproductive one. Bartlett's views on schemas and his portrayal of memory as a reconstructive process have exerted a very significant influence in modern psychology. His work has, however, been criticized on methodological grounds. Bartlett did not explicitly ask his participants to be as accurate as possible in their recollection of the story, nor did he use standardized instructions or care much about the exact environments in which he was carrying out his studies.

In their replication of Bartlett's study, Gauld and Stephenson (1967) did emphasize the importance of accurate recall in a better-controlled experiment. Around half of the errors expected (on the basis of Bartlett's findings) were eliminated, but many errors of the types Bartlett had detected remained. Although Bartlett's procedures were not as strict as one would expect in more recent times, confirmation for his major findings has come from several well-controlled studies (Eysenck and Keane, 2010).

Bartlett (1932) argued that schematic influences were exerted mostly during retrieval. Research by Bransford and Johnson (1972) attempted to identify more precisely the processing stage or stages at which schemas are likely to exert their influence. Bransford and Johnson's study involved participants hearing quite a long speech (partially reproduced below) under three different experimental conditions:

> The procedure is actually quite simple. First, you arrange things into different groups. Of course, one pile may be sufficient depending on how much there is to do. If you have to go somewhere else due to lack of facilities, that is the next step; otherwise you are pretty well set. It is important not to overdo things ...

The three experimental conditions were:

- the 'no title' condition, in which participants heard only the paragraph
- the 'title before' condition, in which participants heard the same paragraph after being told, 'The paragraph you will hear will be about washing clothes'
- the 'title after' condition, in which participants were told that the paragraph had been about washing clothes after they had listened to it.

After hearing the paragraph, participants indicated how easy they found it to understand and tried to recall as much from it as they could.

Participants in the 'no title' and 'title after' conditions found the paragraph much more difficult to comprehend than participants in the 'title before' condition. Of the 18 ideas the paragraph contained, participants recalled an average of 2.8 ideas in the 'no title' condition, 5.8 ideas in the 'title before' condition and 2.6 ideas in the 'title after' condition.

How can this pattern of findings be explained? The what-the-paragraph-is-about information given in the 'title before' condition seems to have activated schematic knowledge about what is involved in washing clothes. This information helped disambiguate the paragraph. When hearing the sentence 'The procedure is actually quite

simple', for example, participants knew that the procedure in question was washing clothes. Words like *items* were encoded in this context as *items of clothing*. Perceiving the passage within the context defined by the relevant schemas improved understanding.

In the 'title after' condition, the information came too late to provide the necessary context. By the time participants heard the title, there was simply not much to comprehend as the relevant material had already been forgotten.

The final study in this section does not address memory in any direct way but it clearly demonstrates a basic property of schemas: that they simplify information-processing and function, to use Macrae et al.'s expression, as *energy-saving devices*.

Macrae et al. (1994) asked participants to carry out two tasks at the same time. In the first task, participants had to form impressions of a number of target persons described by their name and 10 personality characteristics. While carrying out this task, they were also participating in a comprehension test for which there were two conditions: half of the participants were told the jobs of the target persons, half were not.

It was assumed that, when forming their impressions, those who had been informed of the targets' jobs would be able to use their stereotypical knowledge of the professions to simplify the processing demands of the impression-formation task. Participants who relied on the job stereotypes did perform better at both tasks. Thus, for example, knowing that Nigel is a doctor makes the task of processing personality characteristics like caring, reliable, intelligent or hard-working, easier.

To access Additional information 3.1 on an experiment by Bower et al. (1979) on scripts, please visit www.pearsonbacconline.com and follow the on-screen instructions.

Stop

3.4 Reliability of memory

Learning outcomes

- Discuss, with reference to relevant research studies, the extent to which one cognitive process is reliable.

Several of the studies discussed in this section are relevant to schema theory.

Studies of eyewitness memory

The criminal justice system relies heavily on eyewitness testimony. Judges, jurors and the police tend to often treat eyewitness testimony as very reliable. And yet, as evidence from various sources shows, eyewitness memory can be disturbingly inaccurate. An organization was founded in the USA in the 1990s (The Innocence Project), which provided assistance to wrongly convicted persons to overturn their convictions on the basis of DNA evidence. By the end of 2008, this organization helped 220 individuals prove their innocence. What is of importance in the present context is that the guilt of over 75% of these people had been established through mistaken eyewitness identification.

Much of the psychological research on eyewitness testimony has been based on Bartlett's account of memory as a reconstructive process. The idea that eyewitnesses do not reproduce what they witness but, rather, reconstruct their memories on the basis of relevant schematic information has provided the basis of much of the pioneering work on eyewitness testimony by Loftus and her colleagues (Loftus, 1979). What follows is a description of one of their more characteristic experiments.

Eyewitness testimony can be highly unreliable